

*Citation for published version:*

Christodoulakis, S, Polyxeni, A, Nektarios, M, Patel, M, Kapidakis, S, Lina, B & Tonia, A 2005, 'Interoperability of eLearning applications with audiovisual digital libraries', 9th European Conference on Research and Advanced Technology for Digital Libraries (ECDL 2005), Vienna, Austria, 18/09/05 - 23/09/05.

*Publication date:*  
2005

*Document Version*  
Early version, also known as pre-print

[Link to publication](#)

*Publisher Rights*  
CC BY

**University of Bath**

## **Alternative formats**

If you require this document in an alternative format, please contact:  
[openaccess@bath.ac.uk](mailto:openaccess@bath.ac.uk)

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.



# Interoperability of eLearning Applications with Audiovisual Digital Libraries

Stavros Christodoulakis, Polyxeni Arapi, Nektarios Moutoutzis {stavros, xenia, nektar}@ced.tuc.gr  
 Manjula Patel m.patel@ukoln.ac.uk  
 Sarantos Kapidakis, Antonia Arahova, Lina Boudouri {sarantos, tonia, boudouri}@ionio.gr

## Research problem, Aim, Expected Results

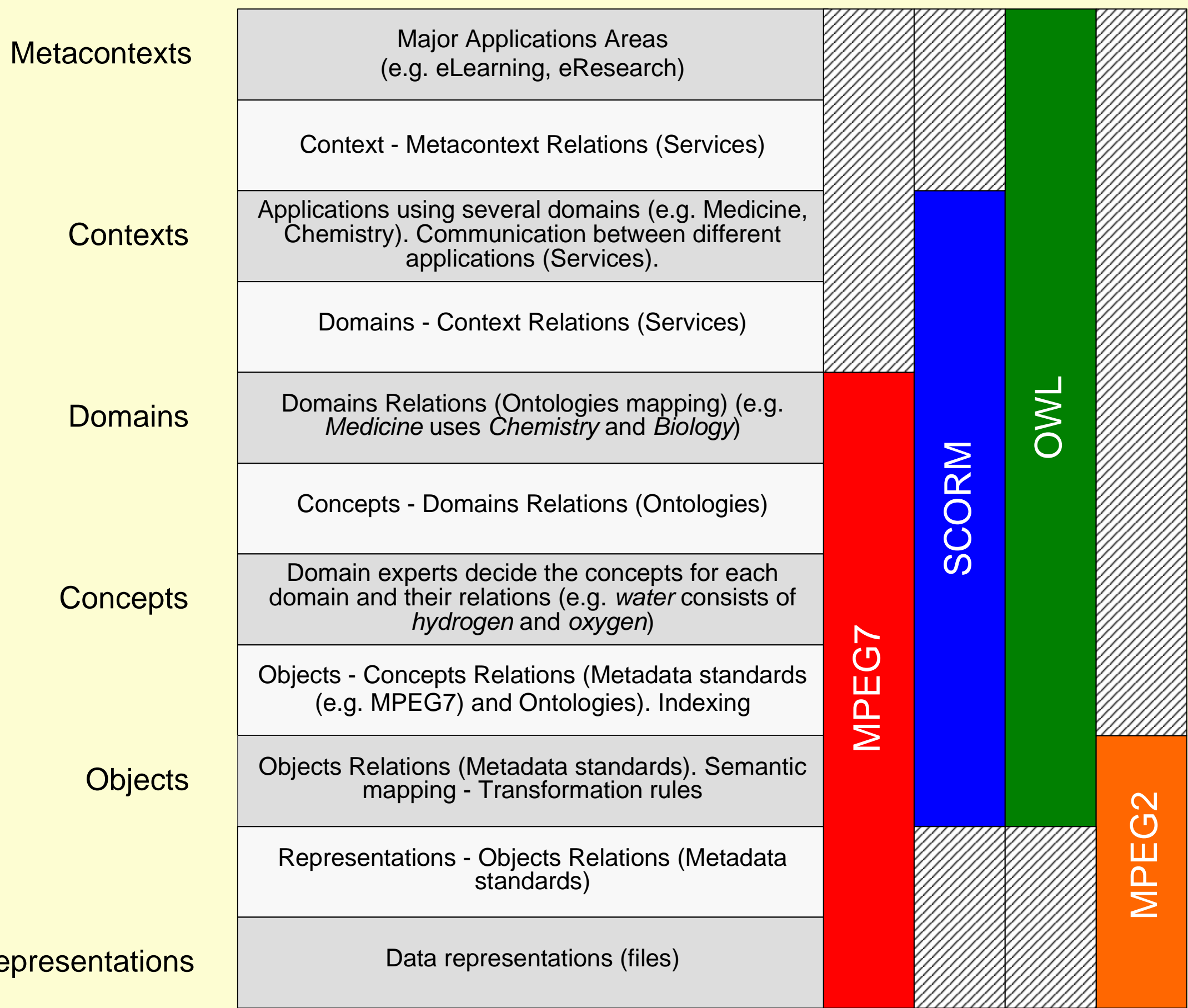
### Research problem

- ✓ Digital Libraries are an important source for the provision of eLearning resources.
- ✓ However, digital library metadata standards and eLearning metadata standards have been developing independently, presenting interoperability issues between digital libraries and eLearning applications (multi-facet problem).

### Aim and Expected Results

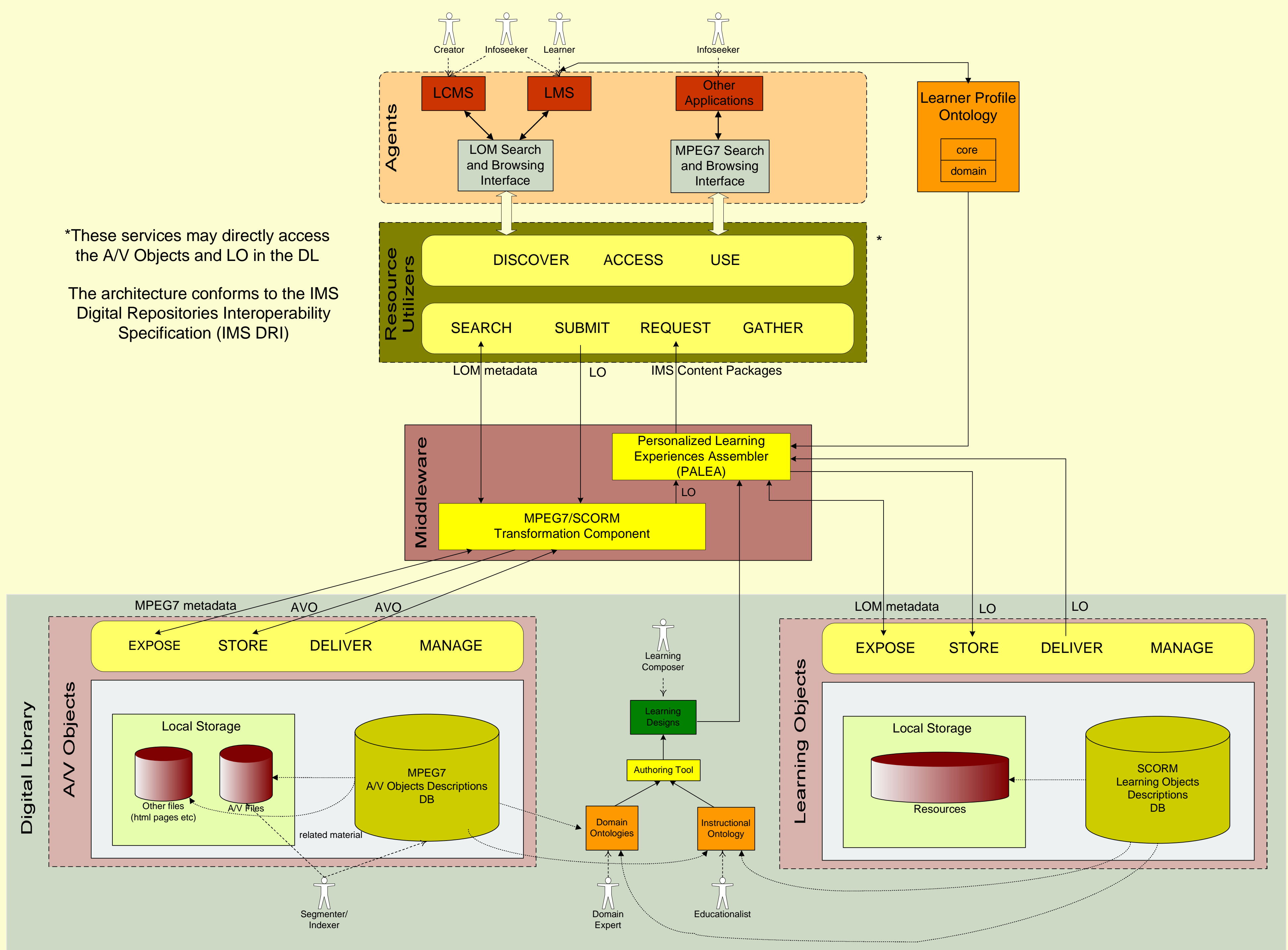
- ✓ Development of a robust model that will allow for the use of semantic descriptions of audiovisual content objects and/or segments that reside on a digital library in order to support the creation of reusable learning objects that may be used in the assembly of personalized learning experiences.
- ✓ Comparative study of the related standards for digital libraries (METS, Dublin Core etc.), eLearning (SCORM) and audiovisual content description (MPEG7) and development of an appropriate interoperability framework for their usage.
- ✓ Investigation of various options for packaging objects and the related metadata (e.g. METS, MPEG21 DIDL or IMS CP) to see which is best suited for the exchange of records within the above interoperability framework.
- ✓ Development of a Learner Model for generating learner profiles for use in creating personalized learning experiences.
- ✓ Development of a demonstrator supporting the above interoperability framework.
- ✓ Measurement of the reactions of different classes of users and their acceptance of the proposed model.

## The multilevel problem of interoperability



- ✓ Modern information systems can be seen as a stack of layers where each one is built on top of the previous one.
- ✓ This conceptual representation in layers is important to understand where the interoperability problem stands: Different data representations, objects, concepts, domains, contexts and metacontexts in the layer stack that should be efficiently managed in a standard way.
- ✓ If one puts different models besides this stack, he may identify gaps and intersection regions so that it is apparent where the interoperability issues among the models occur.

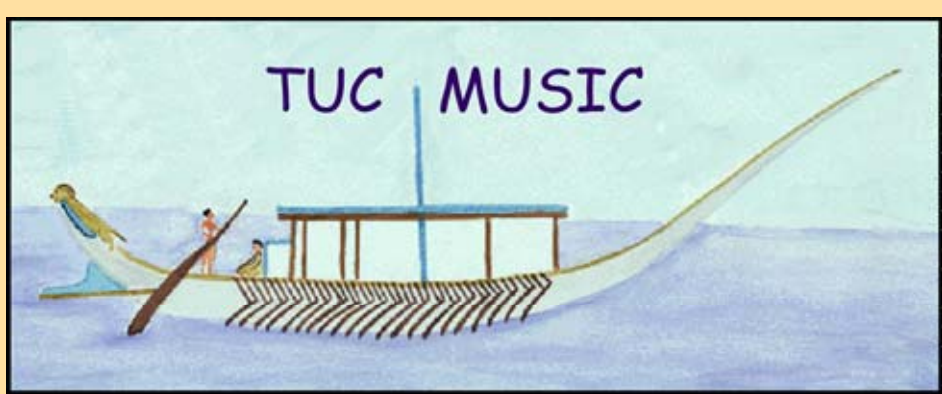
## Demonstrator Architecture



Personalized Audiovisual Learning Experiences System (PALES)

### Components

- ♦ **Digital Library**, logically separated in Audiovisual Objects part, and Learning Objects part.
- ♦ **Applications** (Software Agents in terms of IMS DRI, like LCMS, LMS etc.) discover, access and use the audiovisual content of the digital library through appropriate services (*resource utilizers*).
- ♦ **Middleware**, responsible for the assembly of personalized learning experiences.
  - **MPEG7/SCORM transformation component**
  - **Personalized A/V Learning Experiences Assembler (PALEA)** constructs the personalized learning experiences, taking into account the knowledge provided by the Learning Designs and the Learner Profiles and delivers them in the form of IMS Content Packages.
- ♦ **Ontologies** provide knowledge to the PALEA for the automatic construction of personalized learning experiences.
  - **Domain Ontologies** provide vocabularies about concepts within a domain and their relationships.
  - **Instructional Ontology** provides a vocabulary for the instructional function of a resource and a vocabulary for the construction of possible pedagogical approaches which can be applied to the construction of learning experiences.
  - **Learner Profile Ontology** represents a learner model for the creation of learner profiles.
- ♦ **Learning Designs**: Abstract training scenarios in a certain domain combining information taken from the corresponding domain and the instructional ontology.



Technical University of Crete/  
 Laboratory of Distributed Multimedia Information  
 Systems and Applications



University of Bath



Ionian University/  
 Department of Archives and Library Science